

CLAIMS

What is claimed is:

5 1. A rivet setting device for setting a self-tapping rivet of the type having a hollow rivet body and a mandrel disposed longitudinally within the hollow rivet body, the mandrel including a self-tapping head for forming a hole in a work piece and radially compressing and spreading the rivet body as the mandrel is retracted rearward relative to the rivet body and a shank having an area of reduced diameter for
10 allowing the head to detach from the shank upon application of predetermined tensile force applied to the shank, the rivet setting device comprising:

15 a clutch for gripping and turning the shank for rotating self-tapping head to form a hole in a workpiece; and
a shank retracting assembly for retracting the shank rearward relative to the rivet body for compressing and spreading the rivet body and thereafter separating the shank at the area of reduced diameter,
wherein the self-tapping rivet is set in the work piece.

2. The rivet setting device as claimed in claim 1, wherein the clutch
20 comprises:

25 a body having an aperture for receiving the shank; and
at least one bearing disposed within the body for engaging the shank received in the aperture,
wherein the body includes a tapered channel for urging the bearing into engagement with the shank upon rotation of the clutch.

3. The rivet setting device as claimed in claim 2, wherein the tapered channel narrows from a region of large cross-sectional area to a region of small cross-sectional area counter to a direction of rotation of the self-tapping head.

4. The rivet setting device as claimed in claim 3, wherein rotation of the clutch causes the bearing to move from the region of large cross-sectional area to the region of small cross-sectional area.

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5. The rivet setting device as claimed in claim 4, wherein stoppage of rotation of the clutch allows the bearing to move from the region of small cross-sectional area to the region of large cross-sectional area, disengaging the bearing from the shank.

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6. The rivet setting device as claimed in claim 2, wherein the bearing is a cylindrical bearing.

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7. The rivet setting device as claimed in claim 2, wherein the bearing is a ball bearing.

8. The rivet setting device as claimed in claim 1, further comprising a shank ejection passage for removing the shank after separation of the shank.

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9. The rivet setting device as claimed in claim 8, wherein the aperture extends longitudinally through the clutch and shank retracting assembly for forming the shank ejection passage.

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10. The rivet setting device as claimed in claim 1, wherein the shank retracting assembly is coupled to and rotates with the clutch.

11. The rivet setting device as claimed in claim 1, further comprising a sensing assembly for sensing reduction of torque in the clutch upon completion of

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formation of the hole in the workpiece whereupon the sensing assembly stops rotation of the clutch and causes the shank retraction assembly to retract the shank.

12. A clutch for a rivet setting device capable of setting a self-tapping rivet of the type having a hollow rivet body and a mandrel having a self-tapping head and a shank disposed longitudinally within the hollow rivet body, the clutch for gripping and turning the shank for rotating a self-tapping head of the mandrel to form a hole in a workpiece, comprising:

5 a body having an aperture for receiving the shank; and
 a plurality of bearings disposed within the body for engaging the shank received in the aperture,
 wherein the body includes a plurality of tapered channels each holding a
10 bearing for urging the bearings into engagement with the shank upon rotation of the clutch.

13. The clutch as claimed in claim 12, wherein each tapered channel narrows from a region of large cross-sectional area to a region of small cross-15 sectional area counter to a direction of rotation of the self-tapping head.

14. The clutch as claimed in claim 13, wherein rotation of the clutch causes the bearings to move from the regions of large cross-sectional area to the regions of small cross-sectional area.

20 15. The clutch as claimed in claim 14, wherein stoppage of rotation of the clutch allows the bearings to move from the regions of small cross-sectional area to the regions of large cross-sectional area, disengaging the bearings from the shank.

25 16. The clutch as claimed in claim 12, wherein the bearing is a cylindrical bearing.

17. The rivet setting device as claimed in claim 12, wherein the bearing is a ball bearing.

18. A rivet setting device for setting a self-tapping rivet of the type having a hollow rivet body and a mandrel disposed longitudinally within the hollow rivet body, the mandrel including a self-tapping head for forming a hole in a work piece and radially compressing and spreading the rivet body as the mandrel is retracted 5 rearward relative to the rivet body and a shank having an area of reduced diameter for allowing the head to detach from the shank upon application of predetermined tensile force applied to the shank, the rivet setting device comprising:

means for gripping and turning the shank for rotating self-tapping head to form a hole in a workpiece; and
10 means for retracting the shank rearward relative to the rivet body for compressing and spreading the rivet body and thereafter separating the shank at the area of reduced diameter,
wherein the self-tapping rivet is set in the work piece.

15 19. The rivet setting device as claimed in claim 18, further comprising means for removing the shank after separation of the shank.

20. The rivet setting device as claimed in claim 18, further comprising means for sensing reduction of torque in the gripping means upon completion of formation of the hole in the workpiece whereupon the sensing means stops rotation of the clutch and causes the shank retraction assembly to retract the shank.

21. A method for setting a self-tapping rivet of the type having a hollow rivet body and a mandrel disposed longitudinally within the hollow rivet body, the mandrel including a self-tapping head for forming a hole in a work piece and radially compressing and spreading the rivet body as the mandrel is retracted rearward relative to the rivet body and a shank having an area of reduced diameter for allowing the head to detach from the shank upon application of predetermined tensile force applied to the shank, the method comprising:

5 receiving the shank of the self-tapping rivet;

gripping and turning the shank for rotating self-tapping head to form a hole in

10 a workpiece; and

retracting the mandrel rearward relative to the rivet body for compressing and

spreading the rivet body and thereafter separating the shank at the area

of reduced diameter,

wherein the self-tapping rivet is set in the work piece.

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22. The method as claimed in claim 21, further comprising removing the shank after separation of the shank.

23. The method as claimed in claim 21, further comprising sensing

20 reduction of torque in upon completion of formation of the hole in the workpiece, whereupon rotation of the clutch is stopped and the shank is retracted.